CLAY ALTERATION IN COPPER DEPOSITS ASSOCIATED WITH GRANODIORITES

by

CHARLES MEYER

University of California

ABSTRACT

Recent development at deep levels in the Mt. Con Mine at Butte, Montana, has revealed a structurally early alteration type characterized by K-rich alkali feldspar, brown and green biotite, and 2M muscovite (sericite). This is similar to the K-rich biotite assemblage in numerous porphyry coppers as emphasized by Anderson, Gilluly, Creasey, and Rose. In Butte, and in some of the porphyry coppers, the assemblage is demonstrably earlier than the common feldspar-free, muscovite–quartz–pyrite assemblage which envelops pyrite-rich veinlets. On the other hand, few consistent mineral assemblages or detailed distribution patterns have yet emerged for argillic alteration, where illite, kaolinite, montmorillonite, and locally allophane and pyrophyllite are prominent phases. Probably much of the confusion results from extensive supergene alteration, though even this cannot be proved at present.

In supergene and in hypogene alteration at least below 300°C, supersaturation of SiO_2 in the aqueous phase may play an important role in determining alteration assemblages. Some reactions affected are (1) the hydrolysis of K-spar to K-mica, (2) albite to montmorillonite, (3) silica-rich illite or montmorillonite to kaolinite, and (4) pyrophyllite to kaolinite.

The encroachment of the sericitic zone on the argillic zone at Butte may be controlled by changes in ionic species of the veinward migrating SiO_2 liberated by argillization of plagioclase. Within the sericitic zone and the veins, silica in solution is probably in equilibrium with quartz.

https://doi.org/10.1346/CCMN.1963.0120113 Published online by Cambridge University Press